Determination of compliance deficiencies of hemodialysis patients

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Abstract

Chronic renal failure, a serious disease that is increasing day by day worldwide, causes irreversible nephron loss. In addition, chronic renal failure can lead to complications such as cardiovascular diseases, anemia, and bone metabolism diseases when not controlled. Based on Roy's theory, this study aimed to determine patients' compliance with HD treatment for the first step of the disease and fluid control to provide care. Patients 18 years or older who had the cognitive ability to answer the questions, had been receiving HD treatment for at least six months, had ESRD, could communicate, and voluntarily agreed to participate were included in the study. The "Patient information form," "Fluid Control Scale on Hemodialysis Patients (FCSHP)," and " End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ)" prepared by the researcher were used to collect the data. The FCSHP sub-dimension mean scores of the individuals included in the study were 18.95±2.88 in the knowledge dimension, 22.90±6.89 in the behavior dimension, and 8.63±3.31 in the attitude dimension, respectively. FCSHP's total mean score was found to be 50.48±10.46. The mean score of ESRD-AQ sub-dimension HD participation was 538.12±91.75, drug compliance was 185.17±27.17, fluid compliance was 121.96±59.33, diet compliance was 124.64±58.35, and ESRD-AQ total score was 969.91±180.12. As a result of this study, fluid adaptation and disease adaptation of hemodialysis patients are at a reasonable level. It was determined that the adaptation to the disease increased more in patients who moved from the knowledge dimension to the behavior and attitude dimension in fluid adaptation. In line with these results, it can be recommended that the disease adaptation of hemodialysis patients should be ensured with training and counseling after diagnosis, their adaptation should be evaluated intermittently, and the missing dimensions should be supported individually according to the Roy Adaptation Model.

Keywords: End-stage renal disease (ESRD), hemodialysis, patient, compliance, nephrology

1. Introduction

Chronic diseases are pathological conditions that affect individuals psychologically, physically, socially, and economically; they do not heal completely, require long-term observation, care, and control, and often cause disabilities. Chronic renal failure, a serious disease that is increasing day by day worldwide, causes irreversible nephron loss. In addition, chronic renal failure can lead to complications such as cardiovascular diseases, anemia, and bone metabolism diseases when not controlled (1-4).

Hemodialysis (HD), one of the preferred renal replacement therapy methods in patients with chronic renal failure in Türkiye and other countries, is a life-saving procedure, especially for patients with ESRD. Still, the cost of treatment is relatively high. Increasing patients' quality of life during HD treatment and reducing morbidity and mortality rates are vital for treatment success. On the other hand, patients undergoing HD treatment may experience many physical, psychological, and social problems, such as muscle cramps, pain, loss of appetite, depression, nausea, vomiting, job loss, role loss, and isolation. These problems can negatively affect individuals' daily activities and self-care (2-8).

HD treatment is a method that prolongs the life span of renal patients. In addition, for the treatment to be effective, it is not only limited to drug prescriptions and dietary rules, but success in fluid control is also of critical importance (9-10). In general, it is known that noncompliance with treatment and fluid restrictions is common in hemodialysis patients. In a study examining fluid restriction in hemodialysis patients, it was concluded that only 26% of patients complied with fluid restrictions (11). Similarly, compliance with fluid restriction was found to be relatively low in other studies (10,12-14). However, achieving and maintaining patient compliance is very important in terms of preventing complications, improving quality of life, maintaining survival, and preventing morbidities (15-17).

As long as the patient adapts to the changes in his/her life, he/she can cope with the disease and sustain his/her life. In this process, it is necessary to apply holistic care and use nursing practices and approaches based on scientific knowledge in order to increase patients' compliance with treatment, satisfaction, and quality of life. In order to achieve this, it is recommended to use theories or models specific to nursing

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because nursing theories guide nurses who are in close contact with patients professionally in education, practice, and research activities (18-22).

The Roy Adaptation Model, one of the nursing models, is frequently preferred to ensure adaptation to the disease in HD treatment. Especially individuals receiving HD treatment may experience changes in their roles due to both machine dependence and physical inadequacy. On the other hand, it also causes psychosocial problems such as a decrease in social relations, restriction of working life, fluid restriction, deterioration in sexual functions, and constant fear of the future. One of the most effective methods to eliminate these problems is to ensure the patient's adaptation to the current disease (21,23-26).

According to Roy, the nurse's interventions facilitate the individual's adaptation and treat the individual as a whole in sociological, psychological, and biological aspects. Roy states that this integrity is an essential requirement of human beings. People try to cope with the continuous changes in their environment with biopsychosocial adaptation mechanisms and receive the most critical support from nurses during this period. In hemodialysis treatment, which is a lengthy process, nurses can help patients and their relatives cope with complications by providing education and counseling. Thus, they can ensure that the individual reaches the optimal level of adaptation by using coping mechanisms (21,23-26). In the studies conducted, it was determined that nurses increased patients' fluid compliance and compliance with treatment (27, 28).

Ensuring fluid control compliance in hemodialysis patients will contribute to the improvement and maintenance of their physical health. It will be a guide in determining the patient's compliance with the disease and fluid control, creating individualized plans for the patient, and eliminating the deficiencies in the needed issues. According to Roy, a limited number of studies have been conducted examining the compliance deficiencies of hemodialysis patients (10-13). Based on Roy's theory, this study aimed to determine the compliance of patients receiving HD treatment with the first step of disease and fluid control to provide care aiming to answer the following research questions:

1. How is the adaptation of patients with ESRD who received HD treatment to the disease?

2. What are the fluid control levels of ESRD patients receiving HD treatment?

3. Do the socio-demographic characteristics of patients receiving HD treatment affect their compliance?

4. Do the disease and treatment-related characteristics of patients receiving HD treatment affect their compliance?

2. Materials and methods

2.1. Design

This descriptive and analytical study was conducted to determine the compliance of patients receiving HD treatment regarding disease and fluid control.

2.2. Participants and settings

The study was conducted in three hemodialysis centers (one public and two private) in a province, which allowed the study to be conducted with patients who met the inclusion criteria. The sample size in the study was based on the study titled 'The Relationship Between Fluid Control and Disease Adaptation Levels with Symptoms in Patients Undergoing Haemodialysis' by Atik et al. (2020) with alpha value: 0.05, effect size 0.17, power 0.90 was calculated as 278 patients. A total of 280 patients, 135 women and 145 men, were included in this study. Patients 18 years of age or older who had the cognitive ability to answer the questions, had been receiving HD treatment for at least six months, had ESRD, could communicate, and voluntarily agreed to participate were included in the study.

2.3. Measurements

2.3.1. Patient information form

The researcher created a patient introduction form by reviewing the literature (10-13). The patient information form consists of two separate sections and 24 questions. The first part consists of 9 questions, including socio-demographic characteristics. The second part consists of 15 questions about disease and treatment characteristics.

2.3.2. End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ)

The scale developed by Kim, Evangelista, Phillips et al. (2010) consists of 46 items and five sections (29). It was adapted into Turkish by Ok and Kutlu in 2019 (30). Five items are in the first part of the scale, questioning the patients' ESRD and related treatments. In the other four sections of the scale, dietary recommendations consist of 8 items, fluid restriction 10 items, medications nine items, HD treatment and HD participation 14 items. Six items within these four sections (14, 17, 18, 26, 31, and 46) are Likert-type and directly measure patients' behavior toward treatment compliance. In addition, these six items questioning compliance with diet, compliance with fluid restriction, compliance with medication use, and participation in HD are the compliance behaviors sub-dimension of the scale. The other items in the scale are multiple-choice (yes-no) and are not scored in order to evaluate the history, approaches, and knowledge levels of the patients about the disease and its treatment. For this reason, items 14, 17, 18, 26, 31, and 46, which evaluate the patient's compliance behaviors, and items 15, 19, and 27, which affect the scoring of three of these items, were used in the scale. As the score obtained from the scale increases, the level of treatment compliance increases, and the total score value that can be obtained from the scale varies between 0 and 1200 (30). In this study, Cronbach's alpha was found to be 0.642.

2.3.3. Fluid Control Scale on Hemodialysis Patients (FCSHP)

The FCSHP was developed by Çınar and Albayrak Coşar (2012) to determine HD patients' fluid control compliance levels (31). The scale consists of three sub-dimensions (knowledge-attitude-behavior) and 24 items in total. The knowledge sub-dimension consists of 7 questions, the behavior sub-dimension consists of 11 questions, and the attitude sub-dimension consists of 6 questions. Items 6, 7, 18, 19, 20, 21, 22, 23, and 24 of the scale are scored in the opposite direction, while the other items are in the positive direction. Scores between 7-21 can be obtained from the knowledge sub-dimension, 11-33 from the behavior sub-dimension, 6-18 from the attitude sub-dimension, and 24-72 from the overall scale. The lowest score obtained from the scale is 24, and the highest score is 72, and as the score increases, it is interpreted as the patients' compliance with fluid control increases. Cronbach's alpha coefficients of the sub-dimensions of the scale are knowledge, 0.92; behavior, 0.80, attitude, 0.67, respectively (31). In this study, Cronbach's alpha was 0.891.

2.4. Data collection procedure

The researcher collected the data using a face-to-face interview method for 25 minutes during the four-hour treatment period when patients came to the dialysis session after the necessary explanations were made. The "Patient information form," "Fluid Control Scale on Hemodialysis Patients (FCSHP)," and " End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ)" prepared by the researcher were used to collect the data.

2.5. Statistical analysis

A Statistical Package for the Social Sciences (SPSS 22.0) program was used to analyze the data. Descriptive statistics, normal distribution according to kurtosis skewness values, Mann-Whitney U, t-test, Kruskal-Wallis, ANOVA, and Pearson correlation analysis were used to evaluate the data. Statistically, the $p < 0.05$ value was accepted as significant.

3. Results

The mean age of the individuals included in the study was 62.15±15.15 years, the disease duration was 84.57±82.04 (months), and the duration of hemodialysis was 67.42±69.68 (months). It was found that 51.8% of the patients were male, 43.2% were primary school graduates, 76.1% were married, 72.5% received dietary education from health personnel, approximately half of them partially complied with their diet (53.6%) and fluid restriction (51.1%) and 3.6% needed additional dialysis in the last month. In addition, 85.4% of the patients had problems at home during HD sessions, and 62.5% had problems between two dialyzes (Table 1).

The FCSHP sub-dimension mean scores of the individuals included in the study were 18.95±2.88 in the knowledge dimension, 22.90±6.89 in the behavior dimension, and 8.63±3.31 in the attitude dimension, respectively. FCSHP's

total mean score was found to be 50.48±10.46. The mean score of ESRD-AQ sub-dimension HD participation was 538.12±91.75, drug compliance was 185.17±27.17, fluid compliance was 121.96±59.33, diet compliance was 124.64±58.35, and ESRD-AQ total score was 969.91±180.12 (Table 2).

Table 1. Sociodemographic and disease-related characteristics of patients receiving hemodialysis treatment

Socio-Demographical Characteristics	Number (n)	Percentage (%)
Age ($\overline{X} \pm SS$)	62.15 ± 15.15	
Kidney disease (years)	7.04 ± 6.83	
Kidney disease (months)	84.57 ± 82.04	
HD (years)	5.57 ± 5.78	
HD (months)	67.42 ± 69.68	
Gender		
Woman	135	48.2
Male	145	51.8
Educational Status		
İlliterate	60	21.4
literate	28	53.2
Primary/ Secondary education	199	43.2
High school/Higher education	53	19.0
Marital status		
Married	213	76.1
Single	67	23.9
Income status		
Insufficient	178	63.6
Sufficient	102	36.4
Diet Education		
Yes	203	72.5
No	77	27.5
Following the Diet		
Fits	87	31.1
Partially fits	150	53.6
Does not follow	43	15.3
Compliance with Fluid Restriction		
Fits	91	32.5
Partially fits	143	51.1
Does not follow	46	16.4
Daily Fluid		
500ve altı	11	3.9
500-750	35	12.5
750-1000	65	23.2
1000 and above	169	60.4
Having Problems During HD		
Experiencing Problems	41	14.6
No Problems	239	85.4
Having Problems Between Two Dialysis		
Experiencing Problems	175	62.5
No Problems	105	37.5
Additional Session need		
Needing Additional Session	10	3.6
No need for additional sessions	270	96.4

Table 2. Distribution of total and sub-dimension mean scores of hemodialysis patients fluid control scale and end-stage renal disease compliance scale

Fluid Control Scale on Hemodialysis Patients (FCSHP)	X±SS	Median (Q1-Q3)
Information dimension	18.95±2.88	21.0 (17.0-21.0)
Behavior dimension	22.90±6.89	22.0 (17.0-28.0)
Attitude dimension	8.63±3.31	8.0 (5.0-11.0)
Fluid Control Scale on Hemodialysis Patients (FCSHP) Total Score	50.48±10.46	49.0 (42.25-58.0)
End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ)		
HD attendance score	538.12±91.75	600.0 (475.0-600.0)
Medication compliance score	185.17±27.17	200.0 (150.0-200.0)
Fluid compatibility score	121.96±59.33	100.0 (100.0-150.0)
Diet compliance score	124.64±58.35	150.0 (100.0-150.0)
End Stage Renal Failure Compliance Scale Total Score	969.91±180.12	1000.0 (850.0-1100.0)

Table 3. Distribution of hemodialysis patients fluid control scale and end stage renal failure compliance scale sub-dimensions and total score averages according to some characteristics

Variables	Fluid Control Scale on Hemodialysis Patients (FCSHP)				End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ)				
	Information sub-dimension	Behavior dimension	Attitude dimension	Total score	HD attendance score	Medication compliance score	Fluid compatibility score	Diet compliance score	Total score
Marital status									
Married	18.90±2.90	23.20±6.80	8.60±3.40	0.70±10.40	544.90±88.50	186.90±24.60	125.40±57.60	128.40±55.80	985.60±171.50
Single	19.10±2.80	22.00±7.20	8.70±3.20	9.80±10.70	516.40±99.00	179.90±33.80	111.20±63.90	112.70±64.80	920.10±198.50
P*	0.616	0.218	0.945	0.515	**0.026**	0.066	0.089	0.054	**0.009**
Trainer									
Doctor	19.85±1.97	21.97±6.26	8.54±3.09	50.36±8.55	556.75±81.33	193.24±22.39	120.27±52.94	132.43±49.26	1002.70±148.0795
Nurse	19.66±2.30	25.27±7.70	9.83±3.94	54.77±11.27	533.33±106.75	180.55±38.87	138.88±60.76	147.22±55.49	1000.00±208.8132
Nutritionist	19.18±2.76	23.68±7.10	8.65±3.43	51.53±11.10	536.48±92.91	186.93±22.06	131.98±52.56	133.33±51.04	988.73±163.5799
No Education	17.57±3.41	22.12±6.84	8.40±3.20	48.10±10.65	523.70±94.58	175.97±32.04	105.19±70.04	99.35±69.06	904.22±208.3536
P**	**<0.001**	0.117	0.427	**0.043**	0.169	**<0.001**	**0.012**	**<0.001**	**0.002**
Educational Status									
İlliterate	18.63±2.61	22.93±6.19	8.51±2.98	50.08±9.08	524.16±96.10	179.16±24.85	115.0±53.12	114.16±52.15	932.50±172.18
Literate	18.71±2.77	21.64±5.97	7.64±2.69	48.00±9.53	523.21±93.77	185.71±23.00	107.14±50.39	117.85±53.07	933.92±155.78
Primary education	18.88±3.24	23.75±7.39	9.22±3.70	51.85±11.74	543.80±92.43	186.77±28.70	131.40±58.49	130.16±58.97	992.14±183.65
Secondary education	19.66±2.24	21.16±6.21	8.77±2.79	49.61±8.44	493.05±108.73	180.55±42.49	113.88±61.37	119.44±62.16	906.94±208.42
High school	19.57±2.43	22.35±7.17	7.88±2.98	49.80±9.84	568.45±62.23	190.47±19.87	120.23±72.46	129.76±67.22	1008.92±177.87
High education	18.45±2.80	21.63±7.06	7.90±3.33	48±10.06	547.72±91.14	186.36±23.35	113.63±59.54	127.27±56.40	975.00±157.71
P**	0.502	0.477	0.104	0.460	**0.038**	0.359	0.286	0.569	0.082
Following the Diet									
Fits	19.65±2.35	29.34±5.43	10.91±3.24	59.91±8.46	575.28±66.74	194.25±16.04	168.39±46.45	181.03±31.66	1118.96±111.01
Partially fits	19.04±2.57	20.64±5.21	7.52±2.82	47.21±7.87	528.66±95.29	183.33±27.57	112.00±41.64	112.00±36.49	936.00±134.84
Does not follow	17.20±4.02	17.76±5.26	7.86±2.75	42.83±8.89	495.93±97.88	173.25±36.75	62.79±66.45	54.65±60.56	786.62±203.12
P**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Compliance with Fluid Restriction									
Fits	19.83±2.04	29.37±5.55	11.29±2.95	60.50±7.83	568.40±74.70	193.95±16.38	172.52±41.00	166.48±49.47	1101.37±138.96
Partially fits	18.79±2.74	20.58±4.94	7.53±2.82	46.90±7.54	531.99±93.74	182.86±27.89	113.28±40.22	116.43±41.44	944.58±134.53

Does not follow	17.69±4.02	17.34±4.78	6.76±1.99	41.80 ±7.50	497.28±98.06	175.0± 36.13	48.91±49.98	67.39± 60.75	788.58± 186.61
P**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

*: Student's t-test was used. **: One-way analysis of variance (ANOVA) is used.

In HD patients, the mean scores of the ESRD-AQ HD participation sub-dimension and ESRD-AQ total mean scores of married patients were statistically significantly higher (p<0.05). FCSHP knowledge sub-dimension mean scores, FCSHP total mean scores and ESRD-AQ HD participation, medication compliance sub-dimension, dietary compliance sub-dimensions, and total mean scores were found to be statistically significantly higher in individuals receiving education from health professionals (p<0.05). The mean scores of the ESRD-AQ HD participation sub-dimension were higher in individuals with higher education levels, and this difference

was statistically significant (p<0.05). The mean scores of knowledge, behavior, attitude sub-dimensions and total scores and the mean scores of ESRD-AQ HD participation, dietary compliance, medication compliance, fluid compliance sub-dimensions, and total scores were higher in individuals who stated that they complied with the diet and fluid, and this difference was statistically significant (p<0.05) (Table 3).

It was found that there was a statistically significant positive correlation in the total and sub-dimensions of ESRD-AQ and FCSHP, ranging from weak to moderate (Table 4).

Table 4. Correlation Analysis Between Age, Kidney(months), HD(month), Urine(cc), Fluid Control Scale on Hemodialysis Patients (FCSHP), End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ) and Sub-Dimension Total Scores of Individuals

Fluid Control Scale on Hemodialysis Patients (FCSHP)	End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ)				
	HD attendance score	Medication compliance score	Fluid compatibility score	Diet compliance score	Total Score
Information dimension	r = ,231** p = ,000	r = ,173** p = ,004	r = ,244** p = ,000	r = ,307** p = ,000	r = ,324** p = ,000
Behavior dimension	r = ,318** p = ,000	r = ,224** p = ,000	r = ,703** p = ,000	r = ,648** p = ,000	r = ,637** p = ,000
Attitude dimension	r = ,194** p = ,001	r = ,094 p = ,115	r = ,572** p = ,000	r = ,400** p = ,000	r = ,431** p = ,000
Total Score	r = ,334** p = ,000	r = ,225** p = ,000	r = ,711** p = ,000	r = ,638** p = ,000	r = ,645** p = ,000

4. Discussion

This study aimed to evaluate the disease and fluid adaptation of patients receiving hemodialysis treatment and determine the deficiencies in ensuring the adaptation of individuals. It was determined that the mean ESRD-AQ total score of the patients was 969.91±180.12, and they had a proficient level of disease adaptation. A study conducted in Palestine in 2017 with 220 patients found comparable results (12). In a study conducted with hemodialysis patients by Al-Khattabi (2014), the ESRD-AQ HD participation rate was 55.96%, the ESRD-AQ drug compliance rate was 87.99%, the ESRD-AQ diet compliance rate was 88.37%, ESRD-AQ fluid compliance rate was 87.78% (32). In the study, the FCSHP total scores of the individuals were 50.48±10.46, and fluid compliance levels were high. Similar to the results of the study, in a study conducted with patients receiving hemodialysis treatment, it was found that compliance with fluid restriction was at a moderate level (33). In the study of Naalweh et al. (2017), compliance with fluid restriction in patients receiving HD treatment was reported as 31%, while in the study of Günalay et al. (2017), it was found that 74% of patients showed non-compliance with fluid restriction and 70% of patients experienced varying degrees of dietary non-compliance (11,12). It was determined that the disease and fluid adaptation of individuals differed in the studies. This situation is thought to be affected by different dynamics, such as cultural and educational levels, and may

vary.

This study found that the mean score of the ESRD-AQ HD Participation subscale was significantly higher in married patients. This result suggested that the support of the family in the adaptation to the treatment in Turkish culture and the opportunities provided by the Ministry of Health in accessing HD treatment increased their participation.

The study determined that the sub-dimension scores of those who received training from health professionals (doctor, nurse, dietician) were higher. Previous studies concluded that the training given to hemodialysis patients was effective in patients' compliance with fluid restriction and diet and provided statistically significant increases (27-28,34).

This study determined that ESRD-AQ and FCSHP total and all sub-dimension scores of those who stated that they complied with diet and fluid were high, and this difference was statistically significant. Similarly, in other studies conducted with hemodialysis patients, ESRD-AQ participation and medication compliance scores of those who complied with diet and fluid were found to be high (12,32). Another study conducted in 2016 found that fluid and diet compliance was better in patients with an elevated level of knowledge about dietary compliance and a positive attitude toward it (35). According to these results, it can be said that adaptation to the disease is effective in patients' compliance with diet and fluid

control.

It was found that there was a statistically significant positive correlation in the total and sub-dimensions of ESRD-AQ and FCSHP, ranging from weak to moderate levels. The relationship between the total scores of the scales was found to be moderate. These results show that patients who move from the knowledge dimension to the behavior and attitude dimension in fluid compliance significantly increase compliance with the disease.

As a result of this study, it was determined that the fluid adaptation and disease adaptation of hemodialysis patients were at a reasonable level, and the adaptation to the disease increased more in patients who moved from the knowledge dimension to the behavior and attitude dimension in fluid adaptation. In line with these results, hemodialysis patients' disease adaptation should be ensured with training and counseling after diagnosis, their adaptation should be evaluated intermittently, and the missing dimensions should be supported individually according to the Roy Adaptation Model.

Conflict of interest
There is no conflict of interest.

Authors' contributions
Concept: S.K, Ö.C., Design: S.K, Ö.C., Data Collection or Processing: S.K, A.D., Analysis or Interpretation: S.K, Ö.C., A.D., Literature Search: S.K., Ö.C., Writing: S.K, Ö.C., A.D.

Ethical Statement

This study was performed in line with the principles of the Declaration of Helsinki. Ethical approval from the Erciyes University Clinical Research Ethics Committee (2022/183) and written permission from the institutions were obtained for the research. Approval was obtained from the relevant authors for using data collection tools. In addition, written and verbal informed consent was obtained after explaining the purpose of the study to individuals receiving treatment.

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